



# Ø BEAT



APRIL 1985

COLORADO SPRINGS,  
COLORADO

FRANK DRAKE - KL7IPV  
4964 HARVEST Rd.  
Colorado Springs, CO. 80917

**FIRST CLASS MAIL**



# Ø BEAT



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**ZERO BEAT** is published monthly in the interest of the the members of the Pikes Peak Radio Amateur Association Inc., Colorado Springs, Colorado. Permission is given to reprint articles or excerpts provided credit is given. Deadline for submission of articles is the 21st of the month. Classifieds accepted anytime.

The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Frank Drake KL7IPV, 4964 Harvest Rd. Colorado Springs, CO 80917 597-2406

The board meeting of the Pikes Peak Radio Amateur Association was called to order at 7:00 p.m. in the home of Mark, NØEPF. Present were Mark; Al, NØCMW; Mike, KØTER; Frank, KL7IPV; Les, KCØNC; and Tom, ADØØ.

Novice classes were announced as scheduled to begin April 2 at North Junior High School. They will run Tuesdays and Thursdays from 7 to 9 p.m. for about 8 weeks. There will be a \$2.00 fee to cover the cost of the room obtained from the community school program.

Programs were next discussed. In April, Brad, WA5CWZ, will present an excellent seminar called Living With Lightning. In May, we hope to have Jon, WDØAIT, to speak on the National Traffic System.

Swapfest plans seemed set as of the meeting. Posters have been made and distributed and announcements were occurring on many nets.

In two other items, it was determined the best date for the club picnic would be September 18. The 11th and 25th were picked as alternate dates. Pavilion reservations must be in early which accounts for the action at this time. Also, Field Day plans are being formulated. Volunteers to help in several areas are needed. Mark agreed to coordinate the Novice stations. Contact Mike if you wish to get involved now and be part of the decision making process.

Finally, KØDJ agreed to contact Helen Hayes, WAØHOX, concerning possibilities and procedures if plans to put a station in the School for the Deaf and Blind are successful. She is one of the top people in the Handi-Ham organization. A meeting is to be scheduled soon with the director of the school to continue talks on locating a station at the school. It seems an opportunity is present to not only obtain a club station location but also to provide a valuable service to the school organization.

There being no further business before the board, the meeting was adjourned at 8:30 p.m. The next meeting will be April 15th at the home of Oak, KØROL.

Respectfully submitted,

Mark, NØEPF

From the desk of "Ye Olde Editor"

Well, now that the Swapfest is over, its time to think about summer things. We have the Pikes Peak Hill Climb coming up in July. We also have a couple of walks for worthy causes in April. Call Mike Stansberry to help with the walks. He needs all our help to make them go successfully. I got to thinking about all the repeaters around town. By the count in the CCARC list, there are about 16 repeaters in this city. Of course, many are closed and some are not. With all the people using and putting up repeaters, we should have more members in the PPRAA. If you are reading this and got it somehow other than in the mail, then you are not a member of PPRAA. If that is so, why aren't you? Maybe you think we don't need you. Maybe you think you think you don't need us. Maybe you are thinking alot of things..."we aren't interesting", "we don't care what you have to offer", "you don't care what we have to offer", "we are self centered and don't want new input", whatever. If you are thinking any of those things...you are WRONG! PPRAA should be growing and the amateur population of Colorado Springs IS growing. Why? Have you heard of some incident in the past that is keeping you from joining PPRAA? Have you seen what has been happening in other parts of the U.S.? The only way to keep antenna restrictions, bad zoning ordinances, and uninformed elected officials from damaging amateur radio and our hobby, is to present a unified amateur community. Differences, either in the past or present, should be overlooked or worked out. The PPRAA is one way, in Colorado Springs, that the public at large can see amateur radio in use for the community. That takes a concerted effort by ALL of us. If everyone who uses a repeater or is a trustee were to join PPRAA, then we as a club could get on to helping our community more. Notice I said, "OUR community"; not yours or mine. Maybe if you have been a past member and come back, you might see enough difference that may get you to rejoin. If you have never been a member, give us a chance. It costs \$8 for the rest of 1985. That isn't much when compared to the costs of other things we get for our hobby. One of latest magazines commented that although we are a hobby we are franchized by the FCC to be a public service activity also. The bigger PPRAA gets, the easier it becomes to fulfill that directive. You are reading the PPRAA newsletter. That tells me that you were interested enough to go out and pick one up. Join us, we will save you a trip to where ever you went to get this. I intend to publish columns that will include input from other repeater groups and trustees so that we can all share in what is going on with other area hams. If you have a comment, write me. If I get enough letters, not just gripes, I'll publish them in a letters column. As the man said (I don't know who, so don't write and ask) "If you are not part of the solution, then you are part of the problem". Right now, hams don't need more problems, but we can certainly use help on working on the solutions! Enough of that. This month I have lots of stuff out of GATEWAY and World Radio News. No computer program this month. Have an interesting program? Sent it to me. My computer well is only so deep! As I write this is snowing like I never saw in Alaska. I know that the Swapfest will be a success, so in advance I thank you all for the help and support. I had many calls offering to help and I do appreciate that. Jake did himself proud again this year (I can said that in advance because Jake has never let us down). Les, Al, Oak, Steve, Ron, and many others were very important in making it great. I know I left someone out, I always seem to, but my thanks to you all. Thanks also to Alan, AL7H and Ken, WA6TTY for their input this month. It doesn't take a literary work of art to get published, so those of you who are hesitant, send that article to me. I have been asked by Jake to thank the many companies and people who have contributed to the antenna project for the local emergency communications sites. That will be elsewhere in the newsletter. If you are at all interested in emergency communications, contact Jake and join ARES. You'll feel good when you do. Its free and you do NOT have to belong to PPRAA or ARRL. Just be a ham with a desire to help. Well, that's about a full page, so I wish each and all a very Happy Easter and hope to see a full meeting room this month. When? That's some where else in this issue to.

73 - Frank KL7IPV



## The ARRL Packet-Radio Newsletter

### PACKET AND THE FCC

In late January, the FCC released Notice of Proposed Rulemaking (NPRM) 85-22, proposing to add definitions of "coordinated repeater," "frequency coordinator," and "harmful interference" to Section 97.83 of the FCC rules and regulations. The NPRM also proposes adding text to Section 97.85 concerning resolution of conflicts between repeaters. Complete text of this NPRM is available from the ARRL for an a.s.s. with \$0.54 postage.

In a move that worried many packet-radio experimenters, the FCC stated that "during the pendency of this proceeding there will be a moratorium on new repeater operation in Central Metropolitan Statistical Areas and Metropolitan Statistical Areas." These areas include many growing packet-radio networks. Packet-radio operators are asking whether this moratorium extends to simplex digipeater operation on previously established or coordinated frequencies. Informally, FCC officials have stated that packet radio is not covered by this repeater ban. While no formal determination has been made, it is clear that the FCC did not consider digipeaters before placing the 9-month ban on new repeater installations.

On February 7, the ARRL filed a Petition for Partial Reconsideration, asking the FCC to drop the moratorium on new repeaters from NPRM 85-22. The ARRL sees both practical and legal problems with the ban. Part of the Petition for Partial Reconsideration reads: "the suggested moratorium comes at a very bad time in the evolution of packet-switching networks in the Amateur Radio Service which are dependent on repeaters for their operation. The suggested moratorium will place a chill on the development of packet repeaters and hence the communications experimentation which is presently at the forefront of amateur technology." The FCC should consider this request soon.

Comments on NPRM 85-22 must be filed by July 1, 1985. Since the proposed rule changes would have some impact on frequency coordination for packet radio, packet operators should be sure to comment on the NPRM.

### Ed.

**FOR SALE** — Complete CW/RTTY/ASCII set-up, no other interfaces or equipment needed. Curtis KB 4900 keyboard-sends CW/RTTY/ASCII, metal case, memories, CW prosigns pre-programmed, random code for practice, 12V for field use. Can also be used with paddles or straight key. InfoTech 200 demodulator-CW/RTTY/ASCII with variable shifts, tuning meter, 45-100 baud RTTY, 110-300 baud ASCII, 0-60 wpm CW. Scope, printer outputs, metal case. 12" b/w monitor. Commercial quality equipment with RF shielding. Works fine, excellent condition. New cost \$1100-all for \$350. Don KBØKQ - 635-8973 days, 635-7469 eves.

### VIA PACKETEAR.

### MODEMS AVAILABLE

Jerry Quimby, N4AJH, is making available a limited number of PC boards for EXAR modems. Jerry is selling a finished PC board, parts placement diagram, parts list, schematic diagram and tune-up instructions. The PC board measures 1 1/2 by 3 in., and can be used for either 300-bit/s or 1200-bit/s AFSK operation. If you are interested, send \$8.50 in check or money order to:

Jerry Quimby, N4AJH  
2677 Hereford Rd.  
Melbourne, FL 32935.

These modems are already in service on some heavily-used Florida digipeaters, and the chips in the circuit are the same ones used in all of the available TNCs. Even though you must supply your own parts for the PC board, this is an inexpensive modem.

### VIA DRNET.

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piling a list of active HF packet stations, the frequencies that they use, and the times that they are most active. If you are on HF packet radio, send information about your activity to Gateway, at ARRL Headquarters.

WB9FLW, Ed.

#### INTERMOUNTAIN NETWORK

Dave Pedersen, N7BHC, from Salt Lake City, Utah, will be travelling to Boise, Idaho, hoping to spread packet radio in the west. Dave thinks that the 30 or 40 interested hams in Boise could be linked to the growing network in Salt Lake City by midsummer. Rod Greene, W7ZRC, in Boise feels that extending the link from Boise to Pullman, Washington and then to Seattle would be fairly easy.

If you live in the west, consider attending the Rocky Mountain Division Convention in Jackson Hole, Wyoming, from August 2 through 4. There's a lot of packet activity planned for the Convention, including a presentation by Pete Eaton, WB9FLW, From N7BHC.

#### REPRODUCTION OF GATEWAY MATERIAL

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#### HEADPHONE PHASE SHIFT by Alan Higbie - AL7H

Headphones are hooked up in parallel & in phase. By reversing the leads to one of the phones you change the phase relationship and produce an interesting and useful effect. The received signal seems to move to the center of your head. Very simple and very effective for copying SSB and CW signals through the QRM and noise. To test the effect you might temporarily hang a D.P.P.T. switch onto the headphones and switch in and out of phase. Hear for yourself! 73

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MEETING MEETING MEETING MEETING  
The next general meeting of the Pikes Peak Radio Amateur Association will on April 13th at Guiseppe's Depot at 7:30 PM at #10 S. Sierra St. Brad, W5CWZ will be presenting an excellent program called "Living with Lightning".

\*\*\*\*\*

#### FLASH FLASH FLASH FLASH FLASH

The Novice classes were cancelled due to not being able to find anyone available to teach the code portion of the class. If you can help, please call or contact Mark Richardson, N0EPF. HELP! HELP!

\*\*\*\*\*

#### Another FLASH FLASH FLASH FLASH

ARRL announced in QST that the June 1985 Field Day will be held on June 23/24 NOT on the last weekend as normal. That is to having 5 weekends in the month. So... plan ahead for that. Contact Les if you want to work the Novice station or Mike if you wish to help elsewhere.

\*\*\*\*\*

#### OTHER BOARD OPENING ANOTHER BOARD OPENING

IT IS WITH REGRET THAT THE PPRAA MUST ACCEPT THE RESIGNATION FROM BOB, K0DJ. Bob has conflicting time commitments and will be unable to continue on the board. Therefore; there will be an election at the next regularly scheduled general meeting of the PPRAA on April 13th.

\*\*\*\*\*

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GATEWAY: The ARRL Packet Radio  
Newsletter Electronic edition Volume 1,  
Issue 15 March 13, 1985  
Jeffrey W. Ward, KBKA Editor

David Sumner, K1ZZ  
Executive Vice President

Published by the ARRL  
225 Main Street Newington, CT 06111

#### PACSAT MEETING

I had the good fortune to attend the design meeting for PACSAT held recently in Rosslyn, Virginia. At this meeting, representatives of AMSAT, the Volunteers In Technical Assistance (VITA) and NASA discussed the details of PACSAT funding, design and construction.

The most important issue discussed at the meeting was funding. Like all amateur satellites, PACSAT will be inexpensive, but sources of major funding will still have to be identified. PACSAT represents a unique opportunity for funding organizations to take part in a technological experiment that is also a social experiment; PACSAT, if successful, will prove that low-orbit data-communications satellites can be used to coordinate development and relief efforts in Third-world countries. Of course, PACSAT will also increase the utility of amateur packet radio by providing worldwide packet forwarding. If your group would like to contribute to PACSAT, or if you can help identify sources of major funding, contact: Dr. Gary Garriott

VITA PACSAT Project Officer  
1815 North Lynn Street  
Arlington, VA 22209.

After discussing funding, the group concentrated on technical considerations. Operators will see PACSAT as a packet bulletin board system (PBBS) in low-earth orbit. The PBBS will have somewhere between 2 and 4 megabytes of memory, and you will be able to access the satellite with an AX.25 TNC and some special radio/modems. This is all relatively straight forward, when compared to other aspects of PACSAT's design. AMSAT and VITA hope to have PACSAT launched as a Gateway Special (GAS) payload on the space shuttle. Such a launch places complex constraints on PACSAT's size, shape, propulsion system and construction.

PACSAT must fit in a standard "GAS can" which is only 19 inches in diameter and 20 inches tall. Fitting several megabytes of memory, spacecraft controllers, transmitters, receivers, batteries, and a propulsion system into less than 5 cubic feet will be quite a job. To protect the shuttle and its crew, PACSAT will have to go through safety and construction tests more complex than AMSAT has ever confronted. The successful construction, launch and operation of PACSAT will depend on & demonstrate the best that Amateur Radio has to offer. That this is also a packet-radio project makes it of interest to all Gateway readers.

Ed.

#### EMERGENCY COMMUNICATIONS

Pattie Winter, N6BIB, will be writing a major article on the use of packet radio in emergency communications, and she is seeking information from anyone who has experience in this area. If you have written an article on this subject or done emergency planning which incorporates the use of packet-radio technology, please send a copy of the article to:

Patti Winter, N6BIB  
P.O. Box 537  
Menlo Park, CA 94026.

From KA6M

#### GEORGIA LIAISON

The Georgia Radio Amateur Packet Enthusiast Society (GRAPES) now has a "packet-radio liaison," responsible for sending out information packages about packet radio and keeping other organizations up to date on packet radio in Georgia. People interested in the information package should send \$1.00 and an k.a.s.e. to:

Bill Crews, WB2CPV  
1421 Hampton Ridge Road  
Norcross, GA 30093.

From WB2CPV.

#### HF ACTIVITY

While there is considerable packet activity on the HF bands, it's hard to say when or on what frequencies. To help ease this confusion, paving the way for more HF packet activity, Gateway, with the help of Pete Eaton, WB9FLW, is com-

From the April issue of World Radio News comes the following:

#### BEWARE OF BOGUS YAESU 757 GX RADIOS

Yaesu 757GX radios, considerably different than those being advertised nationally, are showing up in the Midwest. A serial number check with YAESU Headquarters in Paramount, California confirmed these radios are illegal. They are not made for export. Apparently, someone has imported the sets illegally and is passing them off on unsuspecting amateurs. Radios can be purchased cheaper in Japan, and stripped down models even cheaper.

The radios are identical in appearance externally but do not have the CW filter, won't work on the WARC bands, have no warranty and will NOT be serviced by YAESU repair centers in the USA. The manuals are also different than those with the "Made for sale in the USA models". The shipping containers indicate the radios must be returned to Japan for servicing; however, this marking could be easily removed or covered.

The YAESU Headquarters people estimated it would cost about \$150 to bring the illegal radios up to specifications. It is unknown how many of these radios have been brought into the country, but three showed up in the Dayton area during January. These were not purchased from legitimate YAESU dealers.

So, know your dealer and beware of guys who have a "real deal" for you.

Robert McKay, NBADA

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#### THAILAND ON THE AIR

On January 16th, The Thai Minister of Communications released all the bands to amateurs.

John Knight, W6YY

#### TURKEY ON THE AIR

An item of interest to all DX'ers was recently received by Worldradio. Dr. Unal Akbal, TA1A (ex TA1UA), received his license and call sign from the Ministry of Transport and Telecommunications on January 30th, 1985. Dr. Akbal tells us he is the first licensed radio amateur of Turkey.

TA1A's operation schedule is as follows: 14.025+/- 10 kHz and 21.025+/- 10 kHz (CW) and 14.195+/- 10 kHz and 21.250 +/- 10 kHz (SSB). He'll be on the air Saturdays and Sundays. No times were given.

Perhaps this is an indication that Amateur Radio is now becoming legal in Turkey.

\*\*\*\*\*

The FCC advises that its order of 11-08-94, deleting 2310-2390 MHz from the 2300-12450 MHz amateur band, should be corrected to show A2B emission in the remaining 2300-2310 and 2390-2450 MHz bands, instead of A3B.

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The FCC has issued new instructions to volunteer examiner coordinators which became effective January 1, 1985. The requirement of prior notification to the FCC of the location and date of examination sessions has been eliminated. However; FCC continues to require the volunteer examiner to make a prior announcement of an examination session including the place, amount of fee, and how it is to be paid.

(W5YI Report - 1/15/85)

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W5YI reports receiving a letter from Leland Smith Sr., W5KL, vice president of the QCWA, that their Board of Directors has discussed the possibility of filing a petition with the FCC to lower the code speed requirement for General Class licenses to 10 WPM.

"The primary purpose of the petition, as Smith understands it, would be to permit Advanced Class licenses to give General Class examinations and relieve what is rumored to be a serious shortage of Volunteer Examiners with Extra Class licenses."

(W5YI Report - 1/15/85)

CONTINUED ON PAGE 8

Moscow, USSR. No fee schedule was given and we assume that QSL cards are not required, just the log information.

There is a significance to the above prefixes: EM - stations located in the former capitals of guerilla activity; EO - stations in cities that were awarded medals for their contributions toward victory; ER - ER3A located in Moscow; EU - stations located in capitals of the 15 Soviet republics; EV - stations in capitals of Soviet autonomous republics (ASSR), and EW - stations located in "hero cities",

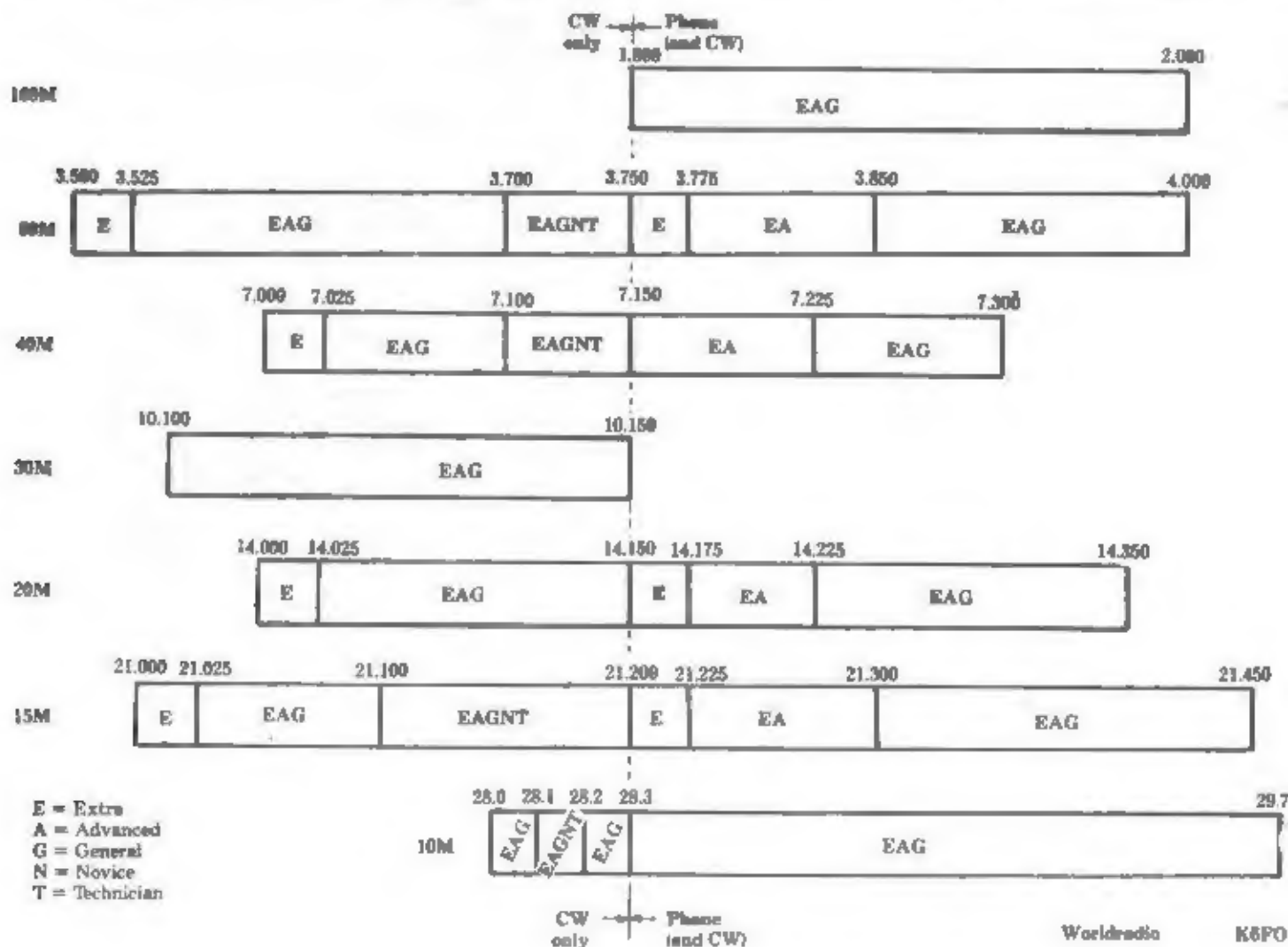
Any Soviet calls with an R added, such as UA1CZ/R, are WORLD WAR II veterans and as far as we understand, are also good for the above award. The awards offered over there are usually quite attractive and worth pursuing.

Down under stations in Victoria (VK3) may use the VI3 prefix in celebration of Victoria's 150th anniversary. And above, stations in Ontario during the period of Feb. 17 - 24 were authorized to use the prefix CG3 to celebrate the anniversary of the Girl Guides movement in Canada.

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## HF band sub-allocations

(Effective 10 October 1984)





# SIMPLE ATTENUATOR

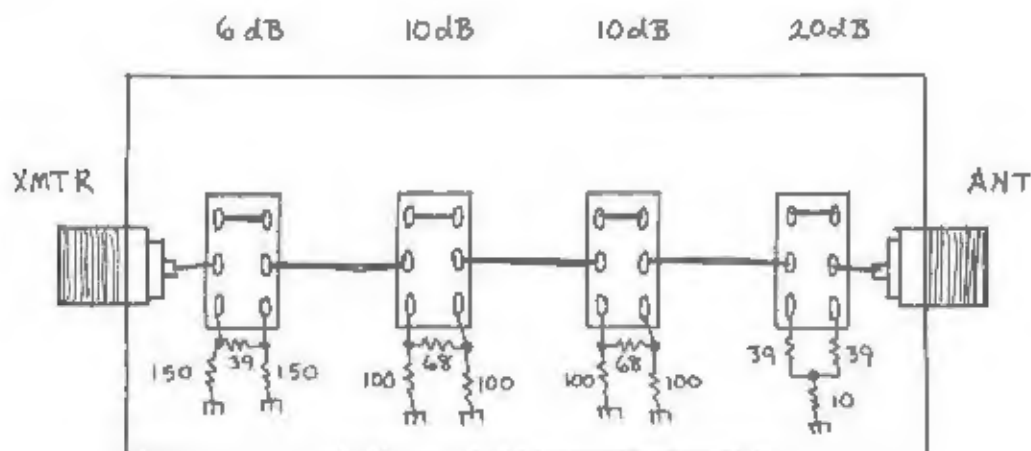
BY KEN WYATT - WA6TTY

Here are the plans for a simple attenuator system which can be used for direction finding work (fox hunting). One of the problems the fox hunter runs into, of course, is that as one approaches the vicinity of the transmitter, the signal strength becomes so overwhelming that the S-meter pins and one loses an important indicator of transmitter direction. An attenuator serves to reduce the signal level until the S-meter again reads in its linear region (becomes un-pinned!).

I have tried to use component values which are commonly available. This compromises the accuracy of the attenuator somewhat; however, it will still be useful as a means for reducing the signal level from a hidden transmitter. Next month, I will publish a BASIC program that will allow one to calculate the exact resistances given a specified attenuation. Assuming one has access to precision resistors, it is possible to construct an attenuator accurate to 0.5dB.

For this design, one will require three to four DPDT toggle switches, a metal enclosure, two coaxial connectors, and the resistors specified in the schematic. Use 1/4 or 1/2 watt resistors. Drill holes for the switches and connectors using the pictorial as a guide. Mount the hardware and solder the resistors as shown. Keep the leads short. For better accuracy, one might wish to isolate each individual attenuator section as shown in the ARRL Handbook design. For this purpose, shielding is not required.

When construction is complete, insert the attenuator between the radio and antenna. By toggling various combinations of switches, values of attenuation from 6 to 46 dB can be inserted. Avoid transmitting through the attenuator as it may become damaged at power levels exceeding two watts. As one approaches within about one mile from the transmitter, attenuation will be required. As one becomes very close, all the available attenuation may be required. Using a system consisting of a two element Yagi antenna and a step attenuator similar to that above, I have typically been able to easily locate the fox within an hour.



INLINE ATTENUATOR - Rear view

Resistances are in ohms. Make resistor ground connections via solder lugs to chassis

GENERAL MEETING MINUTES - MARCH 13, 1985

The regular meeting of the PPRAA was called to order at 7:30PM by Pres. Mike Stansberry. There were a total of 57 members and guests present.

The last general meeting were approved as published in the Zero Beat with a minor correction. There were no board minutes published in the March Zero Beat but will appear in the April issue.

The treasurer reported a balance of \$2,329.21 in the treasury after figuring income and expenses up to march 13th.

Committee Reports:

RFI - KC7RL - no current activity

Field Day - K0TER - need some more volunteers to help. Les volunteered for the HF station. Date of Field Day not known at this time.

Swapfest - KL7IPV - Plans are final for the swapfest - to be held at Phil Long Prep Center (AKA - Vans America) on Sinton Rd. Will go from 8AM to 4PM on March 31st. Help is still encouraged.

Hill Climb - KC8TI - nothing new to report - weather holding up testing.

Public Relations - Maurie, WA0YNP talked about the Channal 13 ad that had WA0YNP talking to Chile. Good PR for all hams and Maurie told how it occurred.

Education - KL7IPV - reported that the General/Advanced ham class will now start on 3/30. Still held at his house. 9 new novices from last class.

By-laws - KC0NC - no report

CCARC - K0ROL - Dak will go to the Aurora Swapfest as the PPRAA representative. CCARC will include Colorado Freq. Co-ord. Committee, and bringing the ARRL Nat'l Convention to Colorado in '86.

ANNOUNCEMENTS:

Al - N0CMW - Tornado & Weather Spot class to be held at the water plant on Mesa Rd. on March 28th at 7:30PM. Call WB8TIB for more info.

Al - N0CMW - 2meter RTTY explained.

Jake - N0CYR - Antenna project for ARES. Centennial Elec donated 4 extendable masts. Miley's Radio also helping.

Jim - N0FPP - talked about a program available for sunspot prediction. Call him if interested in more.

OLD BUSINESS:

Two board positions open due to the resignations of Mark, WB9NFE and Al, N0CMW. Winner to replace Mark was Tom, AD00. Winner to replace Al was Jim, WA9AB8.

March of Dimes - The Walk for the March of Dimes will be on April 28th from 7AM to 5PM. 146.58 simplex will be used for co-ordination. The Walk for Mankind will be held on April 13th. Contact Mike for more details or to help.

ANNOUNCEMENTS:

Board meeting to be held at Mark's on Monday, the 18th at 25 N. Union St. Novice classes to start on Tuesday, April 2nd at North Jr. High. \$2 registration fee. Starts at 7PM.

Fox Hunt will be on the 24th of March so as not to conflict with Aurora Swapfest. Meet at west side of Chapel Hills Mall. See Ken, WA6TTY for details.

OLD BUSINESS: none further

NEW BUSINESS:

Deaf & Blind School gave go ahead for setting up classes and station. Contact Mike if you can help in teaching students or know of someone who has experience. KD7XG in Phoenix has just completed such a class and may offer some advice if he is asked. Contact Ken Britigan at the D & B School for meet. WA8HOX is Handi-Ham contact in Rochester, Minn.

Meeting broke at 9pm to 9:10PM, the door prize drawing was held and then was followed by the program.

The program was on DXing and given by Tom, AD00 and Bob, K0DJ. It included many good suggestions for contesting and how to work that rare DX station. A very good and informative presentation.

ADJOURNMENT:

The meeting was adjourned at 10:15PM.

Respectfully submitted,  
Frank - KL7IPV

If it's CW, it's communications.

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**MFJ** model 106 24/12 hour digital clock with battery back-up  
Regular \$19.95 **SALE PRICE \$16.75**

# MILEY'S RADIO

Jess KØTAA 719 W. 7th St. Florence, Colorado 81226 784-3040

Hours 8 to 6 Tuesday through Friday — Saturdays 8 to 12 — Evening Hours 7:30 to 9 (Call Ahead)

Closed April 13-15 Closed April 19 to May 7 for Vacation

Our remote phone recorder will take your phone number & message, and I'll call you back in the evening.  
Your orders shipped as usual.

## NEW EQUIPMENT IN STOCK

Kenwood TS 940S \$1649 w/auto tuner \$1849.  
Kenwood TS 930S Sale \$1380 w/auto tuner \$1545.  
Kenwood TS 430S w/free FM board \$695.  
Kenwood TS 830S \$779 — TS 130 SE \$555.  
Kenwood DG 5 Digital readout for the 520 \$125.  
PS 430 Power Supply \$134. — PS 30 \$125.  
Kenwood AT 250 auto antenna tuner for 430S \$290.  
Kenwood AT 130 tuner \$125.  
Icom 730 \$599.  
Icom 745 \$765.  
Yaesu FT 757GX \$755.  
New "Amp Supply" LA 1000NT 160-15 meter 1200W PEP-800 DC  
QSK, no tune up, drives with 100W-list \$529 - SALE \$475.  
Kenwood 4000A 2m & 440 FM Xcvt List \$699 Sale \$525.  
Same as above w/ voice synthesizer \$560.  
Kenwood TR-2950 45W List \$459 - Sale \$359.  
Kenwood 7930 \$314.  
Kenwood TR 2600A New HT. \$277 or w/extra battery \$298.  
New Kenwood TH21AT \$198 TH41AT \$214.  
Kenwood TR 3500 440 MHz HT-2 only \$285.  
Santec 142 2M HT \$239, or w/STB BC desk chgr. \$249.  
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Complete line of Tokyo High Power amps, preamps & tuners at lowest prices.  
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Icom 4AT \$229.  
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Icom 27A \$314/Icom 27H \$364.  
Icom 47A \$395.  
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Mirage Amps - Low Prices  
Azden PCS 4000 \$269.  
New KDK 4033 220 MHz mobile \$299.  
New KDK 2033 mini 23W w/TIM & LCD display-1 only \$249.  
Yaesu FT 208R \$229.  
New Yaesu FT 209RH 5 watt FM HT \$298.  
Asiron PS — ALL AMPS — Low Prices  
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Kantronics interface for VIC 20 and others \$125.  
Kantronics Hamsoft for VIC 20 \$46.  
Kantronic-Hamtext for VIC/Com 64 \$90.  
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MFJ wet & dry dummy loads — in stock  
MFJ Tuners and Keyers — in stock  
New MFJ 1224 Interface in stock w/free soft program \$90.  
MFJ 1229 interface w/free soft program \$165.  
Commodore 1702 color monitor \$199.  
Commodore 1541 Disk Drive \$175.  
Commodore MPS 801 printer \$155.

Commodore MPS 802 printer \$209.  
Commodore 64 \$150.  
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Kenwood TR 2500 \$175.  
Kenwood ST 1 desk charger \$40.  
Kenwood 2400 mobile charger/supply \$25.  
Icom 2AT \$135.  
Icom BC 30 desk charger \$45.  
Yaesu FT 208R \$175.  
KLM 2-708 FM only 2 mtr. amp \$65.  
Kenwood TS 930S w/auto tuner-like new \$1095.  
Kenwood TS 520 w/CW filter-no mike \$395.  
Kenwood TS 700SP 2 meter digital all mode \$325.  
Swan HF 700S p.s./spkr., plug in crystal osc. for MARS & CAP.  
New final & driver, extra tubes. Exc. condition \$295.  
Swan 1210 and matching P.S.-good crystal lineup \$85.  
Heath HW 7 QRP CW Xcvt. \$55.  
Heath Shawnee 6 meter AM w/AC & DC adapters \$35.  
Heath HW 101, p.s./spkr. good condition \$190.  
Heath H14 line printer-dot matrix-RS 232-can double as teletype \$120.  
Yaesu YC 601 digital readout for 101's \$119.  
Yaesu 901R Transverter for 101ZD's & 901's. Modules for 6 & 2  
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Yaesu FTV 250 2 meter transverter for 101's \$100.  
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